What is claimed is:

[Claim 1] A Coriolis mass flow sensor, comprising:

a flow tube;

a tube position sensor, including

a light source;

a light pipe having a light inlet situated to receive light from the light source, and a light outlet for emitting light received from the light source;

a light detector for receiving light from the light pipe light outlet; and

a drive device for vibrating the flow tube, such that the flow tube moves through a light path between the light outlet of the light pipe and the light detector.

[Claim 2] The Coriolis mass flow sensor of claim [Claim 1], wherein the light pipe defines a polygon-shaped cross section.

[Claim 3] The Coriolis mass flow sensor of claim [Claim 2], wherein the light pipe defines a generally square cross section.

[Claim 4] The Coriolis mass flow sensor of claim [Claim 1], further comprising a sensing aperture having a predetermined shape situated between the light outlet of the light pipe and the light detector, the sensing aperture passing a portion of the light emitted from the light outlet of the light to the light detector, such that the light entering the light detector has the predetermined shape.

[Claim 5] The Coriolis mass flow sensor of claim [Claim 4], wherein the predetermined shape is optimized to improve the linearity of the tube position sensor.

[Claim 6] The Coriolis mass flow sensor of claim [Claim 4], wherein the predetermined shape is a triangle.

[Claim 7] The Coriolis mass flow sensor of claim [Claim 1], wherein the light outlet is angled to direct the light emitted from the light outlet in a desired direction.

[Claim 8] The Coriolis mass flow sensor of claim [Claim 1], further comprising an optics module body, wherein the light pipe is received in a first opening defined in the optics module body.

[Claim 9] The Coriolis mass flow sensor of claim [Claim 8], wherein the optics module body defines a second opening having an axis oriented generally transverse to an axis of the first opening, the second opening having a lens therein receiving light from the light pipe light outlet.

[Claim 10] The Coriolis mass flow sensor of claim [Claim 9], wherein the optics module body defines a third opening having an axis oriented generally parallel to the axis of the first opening, the third opening having the light detector, and the sensing aperture situated therein.

[Claim 11] The Coriolis mass flow sensor of claim [Claim 10], further comprising a mirror adjacent the second and third openings to direct light from the second opening into the third opening.

[Claim 12] The Coriolis mass flow sensor of claim [Claim 10], further comprising a blocking aperture situated in the third opening, the blocking aperture blocking a portion of the light emitted from the light outlet of the light pipe.

[Claim 13] The Coriolis mass flow sensor of claim [Claim 10], further comprising a lens situated in the third opening.

[Claim 14] The Coriolis mass flow sensor of claim [Claim 9], further comprising a mirror adjacent the first and second openings to direct light from the light outlet of the light pipe into the second opening.

[Claim 15] The Coriolis mass flow sensor of claim [Claim 14], wherein the light outlet of the light pipe and the mirror are on generally opposite sides of the flow tube.

[Claim 16] The Coriolis mass flow sensor of claim [Claim 1], further comprising:

a second light source;

a second light pipe having a light inlet situated to receive light from the second light source, and a light outlet for emitting light received from the second light source; and

a second light detector for receiving light from the second light pipe light outlet.

[Claim 17] A Coriolis mass flow sensor, comprising:

a flow tube;

a tube position sensor, including

a light source;

a light detector for receiving light from the light source;

a sensing member defining a sensing aperture therein situated between the light source and the light detector, the sensing member blocking a portion of the light received by the light detector, such that the light entering the light detector has a predetermined shape; and

a drive device for vibrating the flow tube, such that the flow tube moves through a light path between the light source and the light detector.

[Claim 18] The Coriolis mass flow sensor of claim [Claim 17], wherein the sensing aperture is in a shape to optimize the linearity of the tube position sensor.

[Claim 19] The Coriolis mass flow sensor of claim [Claim 17], wherein the sensing aperture is in the shape of a triangle.

[Claim 20] The Coriolis mass flow sensor of claim [Claim 17], further comprising a light pipe having a light inlet situated to receive light from the light source, and a light outlet for emitting light received from the light source.

[Claim 21] The Coriolis mass flow sensor of claim [Claim 20], wherein the light pipe defines a polygonal square cross section.

[Claim 22] The Coriolis mass flow sensor of claim [Claim 20], wherein the light pipe defines a generally square cross section.

[Claim 23] A Coriolis mass flow sensor, comprising:

a flow tube;

a light source;

first means receiving light from the light source for converting the light from a Gaussian power distribution to a flat power distribution;

a light detector for receiving light from the first means;

a drive device for vibrating the flow tube, such that the flow tube moves through a light path between an output of the first means and the light detector.

[Claim 24] The Coriolis mass flow sensor of claim [Claim 23], further comprising second means for shaping the light reaching the light detector into a desired shape.